

VIDEO PLAYBACK UNIT, VIDEO DELIVERY UNIT AND RECORDING MEDIUM

BACKGROUND OF THE INVENTION

Field of the Invention

5 The present invention relates to a video playback unit of one or more than plurality of videos, a delivery unit and a recording medium.

Description of the Related Art

10 First, one example of a conventional unit capable of playing back and retrieving one video will be described with reference to FIG.25. In FIG.25, a video playback portion 120 reads video data in order from a storage unit 110 by control of a controller 100, and outputs a screen output signal, an audio output signal and a current playback time
15 on a display 130. Further, the video playback portion takes a length of the entire video as a playback length P and outputs it to a playback starting time setting portion 101. When the time to start a playback is set by the playback starting time setting portion 101, the playback starting time setting
20 portion 101 outputs a setting time (q) to the video playback portion 120. When the setting time (q) is inputted, the video playback portion 120 takes the video data of recording position information in the vicinity of the setting time from the storage unit 110 and performs the playback thereof.
25 The display 130 takes a screen output signal, an audio output signal and a current playback time and performs the displaying of the video output, the audio output and the

current playback time.

Another example of the conventional unit will be described with reference to FIG.26. This conventional example is, as shown in the drawing, constituted by a client
5 terminal 105 as the playback unit and a server system 102 connected by a network 104, and the video data are stored in the server system 102.

The controller 100 sends a control signal to the video playbackportion 120, and requests the video playbackportion
10 120 to play back a video. The video playback portion 120 sends a video request signal (r) to a server system 102 via a network 104.

The server system 102 reads the request signal (r) by a video server 103, and sends designated video data to the video
15 server 103 from the storage unit 110. The video server 103 transmits the video data to a client terminal 105 via the network 104.

The client terminal 105 stores the transmitted video data once in a buffer 106, and transfers it to the video
20 playback portion 120. The video playback portion 120 reads the video data and outputs the screen output signal, the audio output signal and the current playback time to a display 130. Subsequent retrieval actions by using a playback starting time setting portion 101 are the same as those of
25 the above described FIG.25 and, therefore, the description thereof will be omitted.

The method of setting a playback starting time (setting

time (q)) for the playback starting time setting portion 101 as in FIG.25 and FIG.26 has conventionally used the following methods of (1), (2). (1) The method of directly inputting the playback starting time. (2) The method of taking a length of the entire video as 100% and determining a designated ratio within that length as the playback starting time.

However, since the setting methods (1), (2) of the above described playback starting time do not reveal what sort of videos are stored at which position of the video data, an user is obliged to set several sorts of times by a time code or a scroll bar and, by playing back according to those setting times, to play back his target videos. For this reason, there was a problem that the retrieval of the videos took a lot of times and labors.

Next, one example of the conventional unit for simultaneously playing back a plurality of videos is shown in FIG.27. By control of the controller 100, the video playback portions 101 to 10n take in order a plurality of video data 1 to n from the storage unit 110, and input them to video playback portions 101 to 10n. The video playback portions 101 to 10n reads in order the video data and outputs the screen output signal, the audio output signal and the current playback time to the display 130. The display 130 takes the playback time, the screen output signal and the audio output signal and performs the display of the playback time, the screen output and the audio output.

This conventional unit has a demerit that, since a processing load corresponding to the number of video data is imposed, the number of videos to be playing back is limited when the playback processing is performed by, for example,
5 a software.

The conventional unit for simultaneously playing back a plurality of videos and playing back from a designated time is shown in FIG.28. For example, when a length of the entire video from the video playback portion 101 is inputted
10 to a playback starting time setting portion 201 as a playback length, the playback starting time setting portion 201 sets a time for performing the playback and outputs the setting time to the video playback portion 101. By so doing, the video playback portion 101 sets the recording position
15 information of the video data in the vicinity of the setting time, and takes the video data from a designated recording position from the storage unit 110 and performs the playback thereof.

The setting method of the playback starting time at
20 the playback starting time setting portion 201 uses the following two methods:

- (1) The method of directly inputting the playback starting time.
- (2) The method of taking the entire length of video data
25 as 100% and determining a designated ratio within that length as the playback starting time.

Since this conventional unit does not reveal what sort

of videos are stored at which position, the user is obliged to set several sort of times and performs the playback from those times onward by way of trial so as to find his target videos and play back the videos of that target. For this reason, there was a problem that the retrieval of the videos took a lot of times and labors.

The other conventional unit includes those where the above described storage unit 110 is provided within the server system connected via a network, and the videos necessary for playback are transmitted to a plurality of video playback portions via the network. However, in the case of this conventional unit, a bandwidth necessary for the transmission of videos depends on the number of videos, there was a problem that a line for high bandwidth is necessary for simultaneous network transmission.

SUMMARY OF THE INVENTION

An object of the present invention is to provide a video playback unit and a delivery unit of videos capable of effectively browsing video scenes contained in video files stored in the storage unit and video files within the server network-connected, or effectively retrieving the target scenes.

Another object of the present invention is to provide the video playback unit and the delivery unit of a plurality of videos capable of simultaneously playing back video files stored in the storage unit and a plurality of video files

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within the server network-connected without increasing a processing load of playback terminals, transmitting and browsing a plurality of videos even within a limited network bandwidth, or browsing, retrieving and playing back the video scenes contained in the videos.

Still another object of the present invention is to provide a recording medium capable of reading with a computer which records the program capable of being played back or performing delivery processing.

10 In order to achieve the above described object, a first characteristic of present invention is that the video playback unit comprises: video playback means for reading in a designated video file and outputting in order to play back the video of the video file; scene description file
15 read-in means for reading in the scene description file which describes the scene inside the video file; means for outputting the time information sequence existing before and after the playback time of the video within the time information described in the scene description file; means
20 for outputting the still image sequence corresponding to the time information displayed, wherein the still image is described in the scene description file; means for renewing the display of the time information sequence and the still image sequence by synchronizing with the playback time of
25 the video; and display means for displaying the above described video, time information sequence and still image sequence.

According to this characteristic, the scene description information can be displayed in step with the playback of the video, and the retrieval and browsing before and after the video that is being played back can be effectively performed.

Further, a second characteristic of the present invention is that it comprises: video description file processing means for reading in a video description file of a designated video group; main video playback means for playing back a first main video file designated by the video information described in the video description file; proxy video file playback means for playback a second proxy video file designated by the video information described in the video description file; and the display means for displaying the first main video and the second proxy video played back by the main video playback means and proxy video playback means, wherein the above described proxy video file is made smaller in a file size or in a coded bit rate in contrast to the above described main video file.

According to this characteristic, since a plurality of videos are constituted by the main video and the proxy video and played back, a plurality of videos can be effectively played back even in a limited transmission bandwidth or decoding capacity.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG.1 is a block diagram showing a schematic

constitution of a first embodiment of the present invention;

FIG.2 is a conceptual illustration of videos stored in a storage unit of FIG.1;

FIGS.3A, 3B are views showing display examples of videos
5 displayed on a display of FIG.1;

FIGS.4A, 4B are views showing the display examples of videos displayed on a display of FIG.1;

FIG.5 is a flowchart for explaining one example of the function of a time information sequence output portion of
10 FIG.1;

FIGS.6A, 6B are explanatory drawings of specific examples of a time information sequence and a still image sequence;

FIG.7 is a block diagram showing a schematic
15 constitution of a second embodiment of the present invention;

FIG.8 is a view showing a display example of the video displayed on the display of FIG.7;

FIG.9 is a block diagram showing a schematic constitution of the third embodiment of the present
20 invention;

FIG.10 is a block diagram showing the schematic constitution of a fourth embodiment of the present invention;

FIG.11 is a block diagram showing a modified embodiment of the fourth embodiment;

FIG.12 is a block diagram showing the schematic
25 constitution of a fifth embodiment of the present invention;

FIG.13 is a block diagram showing the schematic

constitution of a sixth embodiment of the present invention;

FIGS.14A, 14B are views showing display examples of
a main video and a proxy video;

FIG.15 is an explanatory drawing of a first abstracted
5 video;

FIG.16 is an explanatory drawing of a second abstracted
video;

FIG.17 is an explanatory drawing of a third abstracted
video;

FIG.18 is a block diagram showing the schematic
10 constitution of a seventh embodiment of the present
invention:

FIG.19 is a block diagram showing a modified embodiment
of the seventh embodiment;

FIG.20 is a block diagram showing the schematic
15 constitution of an eighth embodiment of the present
invention;

FIGS.21A, 21B are explanatory drawings of a switching
processing of the main video and the proxy video;

FIG.22 is a block diagram showing the schematic
20 constitution of a ninth embodiment of the present invention;

FIG.23 is a block diagram showing the schematic
constitution of a tenth embodiment of the present invention;

FIG.24 is a block diagram showing the schematic
25 constitution of an eleventh embodiment of the present
invention;

FIG.25 is a block diagram showing one example of a

conventional unit;

FIG.26 is a block diagram showing another example of the conventional unit;

FIG.27 is a block diagram showing another example of the conventional unit; and

FIG.28 is a block diagram showing another example of the conventional unit.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

FIG.1 is a block diagram showing a schematic constitution of a first embodiment of the present invention. The video file stored in a storage unit 1, as shown in FIG.2 for example, comprises at least a video data (containing audio data), a still image sequence data $V(t_n) = P_n$ and a time information sequence data (t_n) showing the time of the still image sequence data.

A video playback portion 2 takes in order the video data of the video file designated by control of a controller 7 from the storage unit 1, and outputs a screen output signal, an audio output signal and a current playback time to a display 6. The display 6 takes the current playback time, the screen output signal and the audio output signal, and performs the display of a playback time, the display of the screen output and the audio output. The video playback portion 2 can play back the video from the time decided, for example, by time information selected within at least one of the time information sequence and the still image sequence to be

described later. For example, in the display screens of
FIGS.3A, 4A to be described later, if any one from a time
information sequence T or a static screen sequence P is
selected by a mouse and the like, the playback can be started
5 from that selected time or that video of the static screen.

A scene description file read-in portion 3 can read
a time information sequence data positioned before and after
the current playback time from the time information sequence
file stored in the storage unit 1 by control of the controller
10 7. The scene description file read-in portion 3 can also
read the still image sequence data corresponding to the time
information sequence data from a still image file stored
in the storage unit. 1. The scene description file read-in
portion 3 can read in the above described time information
15 sequence data and the above described still image sequence
data of the predetermined number of pieces.

The current playback time (T_v) obtained in the video
playback portion 2 is inputted to the scene description file
read-in portion 3 and a time information sequence output
20 portion 4. The scene description file read-in portion 3
take the time information sequence data and the still image
sequence data from the storage unit 1 based on the current
playback time information (T_v), and inputs a time information
sequence data (a) to the time sequence information sequence
25 output portion 4 and a still image sequence data (b) to a
still image sequence output portion 5, and displays the time
information sequence and the still image sequence on the

display 6. Incidentally, assuming that the playback time of the video data is taken as (T_0) , since the relationship between the time information sequence data (t_n) in the video file and the current playback starting time (T_v) is $t_n =$
5 $T_v - T_0$, the scene description file read-in portion 3 can take the time information sequence data and the still image data from the storage unit 1 by using this relationship.

Display examples of the display 6 are shown in FIGS. 3A, 3B and FIGS. 4A, 4B. On the display 6, a screen output V
10 (T_v) of the current playback time, the time information sequences $T_{n-2}, T_{n-1}, T_n, T_{n+1}, T_{n+2}$ and the still images $P_{n-2}, P_{n-1}, P_n, P_{n+1}, P_{n+2}$ are, for example, displayed as illustrated. Further, the time information sequence T and the still image P are displayed in relation to the screen output V (T_v) .

15 The renewal of the display of the still image sequence P of the display 6 is performed at a point of time when (T_v) has passed T_{n+1} assuming that the video being played back is taken as V (T_v) at a point of the time (T_v) , the nth time information in the scene description file is taken as (T_n) ,
20 and the still image is taken as (P_n) in the examples of FIGS. 3A, 3B. On the other hand, in the examples of FIGS. 4A, 4B, at a point of time when the time (T_v) of the playback video has passed T_{n+5} , the whole of the time information sequence T and the still image sequence P are eliminated, and by
25 displaying the time information sequence T and the still image sequence P which begin from a new time information T_{n+5} and a new still image P_{n+5} , the renewal of a display content

is performed. The renewal of this display content is just one example, and the renewal may be of other display contents.

The renewal of the display content can be performed by the time information sequence output portion 4. A renewal
5 action of the display content of the time information sequence output portion 4 will be described with reference to a flowchart of FIG.5. In step S1, the time information sequence output portion 4 receives a playback starting time (T0) and a current playback time (Tv) from the video playback
10 portion 2. In step S2, it is determined whether the current playback time (Tv) realizes $T_n \leq T < T_{n+1}$ (provided that $T_n = t_n + T_0$) or not for a time information (Tn) and T_{n+1} a still image. When this determination is affirmative, the process advances to step S3 and displays still images P_{n-2}
15 to P_{n+2} . On the other hand, when the determination of step S2 is negative, the process advances to Step S4 and changes the display of the still images to P_{n-1} to p_{n+3} . In step S5, it is determined whether the playback processing is completed or not and, when this determination is negative, the process
20 advances to step S6, and 1 is added to n. Hereinafter, the same actions as described above are repeated until the above described step S5 becomes affirmative.

Incidentally, as for the content of the time information sequence data (tn), various description methods related to
25 the videos can be used. As one example, a time code sequence being increased by a designated time step, a time code sequence of a top of a cutting point showing a change of

a video scene, a time code sequence of a key frame point showing a center of a scene, a time code sequence showing a changing point of an accompanied audio from an audible sound to a non-audible sound, a time code sequence showing
 5 the time when a specific effective sound such as clapping, laughter and the like were generated, a time code sequence showing the time when a specific video such as a telop, a CG video and the like were generated, a time code sequence designated arbitrarily by the user, or a time code sequence
 10 combining all those described as above can be used. Further, the starting time and the section length of each scene can be used as the time information sequence.

FIG.6A shows an example where video scene switching times t_1, t_2, \dots are used as the time information sequence
 15 and videos P_1, P_2, \dots at those times are used as the still image sequence. FIG.6B shows an example where key frame point times t_1, t_2, \dots in the scene are used as the time information sequence and the videos P_1, P_2, \dots at those times are used as the still image sequence.

20 Incidentally, in the case where the scene description file is read into the scene description file read-in portion 3 from the storage unit, there are two types of read-in methods available where the whole of the scene description file is read in and where the scene description file only
 25 corresponding to the fixed time information sequence and still image sequence is read in. In the former case, there is a problem that it takes a plenty of reading time since

all the information is stored, while in the later case there is a merit of being able to output the scene description file at high velocity once it is read. On the other hand, in the later case, though the reading time of the scene description file is short, it is necessary to read in the scene description information from the storage unit each time the display of the scene description information is renewed.

Next, a second embodiment of the present invention will
10 be described with reference to the block diagram of FIG.7.
This embodiment is such that the still image sequence related
to the video playback is performed from the video file and
the scene description file by using a command input.

The video playback portion 2 takes the video data of the video file designated by the controller 7 in order from the storage unit 1 by the command from the command input portion 8 and inputs them to the video playback portion 2. The video playback portion 2 takes the video data in order and outputs the screen output signal, the audio output signal and the current playback time on the display 6. The display 6 takes the playback time, the screen output signal and the audio output signal and performs the display of the playback time, the screen output and the audio output.

Further, when the time information is inputted to the
25 command input portion 8, a designated time information is
inputted to the video playback portion 2 via the controller
7, and the playback is started from the designated time.

Further, the playback time information (T_v) is inputted to the time information sequence output portion 4 similarly to the first embodiment and, accompanied with an elapse of time, the time information sequence and the still image sequence information are renewed, and new time information sequence and still image sequence are displayed on the display 6.

As for the command input method, various input methods are conceived. One example is a method of directly designating the time information, whereby the video playback, the display of time information sequence, and the still image sequence are performed by using the inputted time by the user. Another method is to designate a time information in the displayed time information sequence, or to designate a still image in the still image sequence and input the designated time or still image. Further, it is possible to perform a time designation by using means for designating the time information sequence before and after and the time information before and after such as skip buttons 20, 21, 22, 23 as shown in FIG.8.

For example, in FIG.8, though the time information sequences up to times T_{n-2} to T_{n+2} and the still image sequence (P_{n-2} to P_{n+2}) are displayed, the skip button 20 can designate the movement of these sequences to five former time information sequences (T_{n-3} from T_{n-7}) and the still image sequences (P_{n-3} from P_{n-7}) in point of time. Further, the skip button 21 can designate the movement of these sequences

to one former time information sequences (T_{n-3} to T_{n+1}) and the still image sequences (P_{n-3} to P_{n+1}) in point of time.

Next, a third embodiment of the present invention will be described with reference to the block diagram of FIG.9.

5 The scene description file read-in portion 3 performs reading from the storage unit 1 via a cache memory 9. The cache memory 9 reads in order the scene description information to be displayed next to the scene description information being displayed on the current display 6 from the storage
10 unit 1. The actions thereafter are the same as those of the first embodiment and, therefore, the description thereof will be omitted.

When the scene description information file capacity is large, a large bandwidth is required each time the scene
15 description information is read and it takes a plenty of times until the next scene description information is read. In addition, there is a possibility of inhibiting the bandwidth to read in the video data from the storage unit. However, when the cache memory 9 is used, the scene
20 description information can be continuously displayed on the display 6. Further, by continuously reading in the scene description information into the cache memory 9, a data transmission bandwidth can be made constant and it is, therefore, possible to continuously reproduce the video
25 without inhibiting a bandwidth necessary for reading the video from the storage unit 1.

Next, a fourth embodiment of the present invention will

be described with reference to the block diagram of FIG.10. Although the above described first and third embodiments were the retrievable video playback units for displaying the video data of the video file stored in the storage unit 1, the time information sequence of the scene description file and the still image sequence information and the like on the display 6, the present embodiment provides a delivery unit which is a server capable of delivering the video data of the video file of the storage unit 1, the time information sequence of the scene description file and the still image sequence information and the like via a network.

In FIG.10, the video file information designated by the command input portion 21 is inputted to a delivery controller 22 and, by control of the delivery controller 22, the video data designated by the command input portion 21 is taken in order from the storage unit 1 and is inputted to a video transmitting portion 23. At the same time, by control from the delivery controller 22, the scene description data related to the video designated by the command input portion 21 is taken in order from the storage unit 1, and is inputted to the scene description data transmitting portion 24.

The video data and the scene description data are read from the video data transmitting portion 23 and the scene description data transmitting portion 24 at respective characteristic data transmitting rates R1, R2, and are inputted to a network transmitting portion 25, and each data

is delivered to a network 26.

The video data transmitting rate R1 can be decided by calculating information content per unit time from a file size of the video file and a video playback time. Further, 5 the scene description data transmitting rate R2 can be decided by calculating information content per unit time from the scene description file size and the video playback time. Another way capable of deciding the transmitting rate is to calculate information content per unit time from the 10 time to be displayed finally in the scene description file and the scene description file size.

Further, the command input portion 21, as shown in FIG.11, receives the input from a terminal connected via a network 27 at a network receiving portion 28 and may take 15 that information as a command input. By so doing, at that terminal, the same retrieval as that of the first embodiment can be performed.

Next, a fifth embodiment of the present invention will be described with reference to the block diagram of FIG.12.

20 In FIG.12, when the video file is designated at the command input portion 31 of the terminal 30, the designated video file information is inputted to a controller 32 and is outputted to a network transmitting portion 33. The designated image file information is inputted to a network 25 receiving portion 28 of the delivery unit (server 20) from the network transmitting portion 33 via the network 27, and is subjected to a command input processing through the

command input portion 21. The video data designated by the delivery controller 22 is taken in order from the storage unit 1, and is inputted to the video data transmitting portion 23. Similarly, the scene description data related to the video designated at the command input portion by control from the delivery controller 22 is taken in order from the storage unit 1 and is inputted to the scene description data transmitting portion 24.

The video data and the scene description data are read from the video data transmitting portion 23 and the scene description data transmitting portion 24 at respective characteristic data transmitting rates R1, R2, and are inputted to the network transmitting portion 25, and respective data are delivered to the network. The delivered video data and scene description data are inputted to a network receiving portion 34 of the terminal 30 via network 27 and temporarily stored in a cache memory 35.

The cache memory 35 reads in the video information currently displayed on the display 6, the video information to be displayed next to the scene description information and the scene description information in order from the network. The actions thereafter are the same as those of the first embodiment.

In general, when the scene description information file capacity is large, a large bandwidth is required each time the scene description information is read and it takes a plenty of times until the next scene description information

is read. In addition, there is a possibility of inhibiting the bandwidth to read the video data from the storage unit. However, when the cache memory 35 is used, the scene description information can be continuously displayed on the display 6. Further, by continuously reading in the scene description information into the cache memory 35, a data transmission bandwidth can be made constant and it is, therefore, possible to continuously play back the video without inhibiting a bandwidth necessary for reading the video from a video delivery unit network-connected.

Furthermore, when the time information is designated from the command input portion 31, the designated time information is inputted to the delivery controller 22 via the controller 32, the network transmitting portion 33, the network 27, the network receiving portion 28 and a command input portion 21. Subsequently, the video data and the scene description data from the designated time are taken in order from the storage unit 1, and are inputted to the video data transmitting portion 23 and the scene description data transmitting portion 24. These data are inputted to the video playback portion 2 and the scene description file read-in portion 3 through the network transmitting portion 25, the network 27, the network receiving portion 34 and the cache memory 35, and the playback of the video from the above described designated time is started. The playback time information (Tv) is inputted to the scene description file read-in portion 3 and the time information sequence

output portion 4 from the video playback portion 2, and the time information sequence and the still image sequence information are renewed and new time information sequence and the still image sequence are displayed on the display
5 6. A display state of the display 6 is the same as FIG.3A, FIG.4A.

As is clear from the above description, according to each of the above described first to fifth embodiments, since the scene description information can be displayed to match
10 the playback of the video, the retrieval and the browsing of the video before and after the video being played back can be effectively performed.

Further, by selecting a necessary scene, for example, by using the skip buttons 20 to 23 of FIG.8, the playback
15 from that scene and the scene description information before and after that scene can be displayed and, therefore, the video can be effectively retrieved at a random access time.

Furthermore, the video data and the scene description information can be delivered at a constant transmission speed
20 (rate) from the delivery unit or the server unit and it is, therefore, possible to smoothly perform the video playback and the video retrieval in the terminal network-connected.

Next, the invention will be described below, wherein a plurality of video files are simultaneously played back
25 without increasing the processing load of the playback terminal, or a plurality of videos can be transmitted and read or looked even in a limited network bandwidth.

A sixth embodiment shown in FIG.13 is such that a main video file and a proxy video file are simultaneously played back and displayed. By control of a controller 40, a video description file processing portion 44 reads a designated video file from a storage unit 41. Next, the video description file processing portion 44 reads in order a designated first main video file from the storage unit 41 designated by the video description file and input it to a main video playback portion 42. The main video playback portion 42 reads in order the main video data which is the first video data and outputs a screen signal. A display 45 takes the screen output signal and the audio output signal from the main video playback portion 42 and performs the screen output and the audio output.

Further, the video description file processing portion 44 takes in order the proxy video file which is a second video designated by the video description file from the storage unit 41 and inputs it to the proxy video playback portion 43. The proxy video playback portion 43 reads in order the proxy video data and outputs the screen signal. The display 45 takes the screen output signal and the audio output signal from the proxy video playback portion 43 and performs the screen output and the audio output.

As for the above described video description file format, it can be described by using SMIL (Synchronized Multimedia Integration Language) standardized by W3C (World Wide Web Consortium) and the like.

As one example of the video description file format, if it is, for example, constituted by the main video 1 and the proxy video 2, it can be described as follows:

ID#M1, video size (HM1,VM1), display position (XM1,YM1)
5 ID#2, video size (HS2,VS2),display position(XS2,YS2)
ID#M1, file storing position #M1, file name #M1
ID#S2, file storing position #S2, file name #S2

As for the output position of the proxy video, the proxy video 2 can be displayed inside the screen of the main video
10 as shown in FIG.14A, or the proxy video 2 can be displayed outside of the screen of the main video 1 as shown in FIG.14B.

Here, in contrast to the main video file, the proxy video file can use a file being small in a video size or an encoded bit rate. In this way, the processing load
15 necessary for playing back the proxy video can be reduced in contrast to the processing load necessary for playing back the main video.

Furthermore, as the proxy video file, an abstracted video having a short playback time in contrast to the main
20 video file can be used. As the abstracted video, an abstracted time video such as shown in FIG.15, an abstracted shot video such as shown in FIG.16 and an abstracted still image video such as shown in FIG.17 can be used.

In the case of the abstracted time video, in FIG.15,
25 first, the main video is divided into time intervals T1. Next, regarding each divided section T1, a section T2 only of the top of each section is, for example, extracted, and

the video combining these sections T2 is used as the abstracted time video.

In the case of the abstracted shot video, in FIG.16, first, the main video is divided into shots which are changing units scene of the main video. As for the method of shot division, the cutting point detection method of the patent application by the present applicant, which is disclosed in Japanese Patent Laid-Open No.11-252509, can be used. Next, regarding each shot S1, S2, . . . , sections T1, T2, . . . only of the top of each shot are, for example, extracted, and the video combining these sections is used as the abstracted shot video. Incidentally, as for the length of sections T1, T2, . . . , it is possible to use a constant length or decide a length proportional to the shot length. Further, it is possible to combine several representative shots selected from the shots and take them as the shot videos.

In the case of the abstracted still image video, in FIG.17, first, a representative still image is selected from the main video. As for the selection method, the top videos and the like of the sections used by the abstracted time and abstracted shot can be used. Next, the abstracted still image video is formed by combining these still images. In this case, in order to display a representative still image for a constant period of time and switch over to the next still image, a dummy information D of certain time intervals is added and formed so that it can be used as a pseudo video.

Further, the proxy video playback portion 43 in FIG.13 can use a playback processing system having a small processing load in contrast to the main video mage playback portion 42. For example, there is a method of reducing the processing load by reducing the number of playback processing frames by sampling the number of frames to be played back at constant intervals. Further, as disclosed in Japanese Patent Application No. 2000-00095 "Encoded Video Data Playback Unit And It's Storage Medium" by the patent application by the present patent applicant, there is also a method of decoding a part only of the video information at the time when a compressed data is decoded so as to reduce the processing load.

Next, a seventh embodiment of the present invention will be described with reference to the block diagram of FIG.18.

This embodiment is characterized in that a main video file and a proxy video file are switched by using a command input.

By control of the controller 40, the video description file processing portion 44 reads in the designated video description file from the storage unit 41 and displays the designated main video 1 and proxy video 2 as described in the sixth embodiment on the display 45.

Next, by order from the command input portion 46, when the controller 40 performs the switching control of the main video and the proxy video, the proxy video file information is read in the video description file processing portion

44 as the main video file (hereinafter, referred to as new
main video file) and, conversely, the main video file
information as the proxy video file (hereinafter, referred
to as new proxy video file). Subsequently, the video
5 description file processing portion 44 takes in order the
new main video file and the new proxy video file from the
storage unit 41 and inputs them to the main video playback
portion 42 and the proxy video playback portion 43,
respectively.

10 The main video playback portion 42 reads in order the
main video data of the new main video file and outputs a
screen signal, and the proxy video playback portion 43 reads
in order the new proxy video data and outputs the screen
signal. The display 45 takes the screen output signal and
15 the audio output signal from the main video playback portion
42 and the proxy video playback portion 43 and performs the
screen output and the audio output.

Incidentally, the setting of the playback starting time
at the time of switching from the playback of the main video
20 to the playback of the proxy video can utilize several setting
methods. As one method, a starting time of each video is
utilized as the playback time at the time of switching. As
another method, the time of the main video of FIG.19 is
inputted to the controller 40 and that time can be taken
25 as the playback starting time of the new main video so as
to start the playback.

Next, an eight embodiment of the present invention will

be described with reference to FIG.20. This embodiment is characterized in that the main video file and a plurality of proxy video files are switched by using the command input.

By control from the controller 40, the video description
5 file processing portion 44 reads in the video description
file from the storage unit 41, and the main video file (for
example, the first video file) designated by the video
description file is read in order from the storage unit 41
to the main video playback portion 42, and the video is
10 displayed on the display 45. Further, the proxy videos 1
to n are read in order from the storage unit 41 to the proxy
video playback portions 71 to 7n, and n pieces of the proxy
videos are displayed on the display 45.

Next, by control from the command input portion 46,
15 when a certain proxy video file (for example, the mth proxy
video file) is designated from the controller 40, in order
to switch the main video, the information related to the
mth main video file is read into the video description file
processing portion 44, and the mth main video file is taken
20 in order from the storage unit 41 and inputted to the main
video playback portion 42. The main video playback portion
42 reads in order the mth main video data and display the
video. In this case, the main video being played back is
played back from one within the proxy videos being played
25 back. The switching flowchart is shown in FIG.21A.

As for the display method of these videos, in the same
way as in FIG.14, there are methods such as displaying the

n pieces of proxy videos inside the screen of the main video or displaying the proxy video outside of the screen of the main video.

By sufficiently reducing the processing load necessary
5 for playing back the n pieces of the proxy videos, one piece of the main video and the n pieces of proxy videos can be played back even for the playback unit having a limited processing capacity.

As a modified example of the eighth embodiment, in the
10 same way as in FIG.8, there is a video switching method as follows. By control from the controller 40, the video description file processing portion 44 reads in the video description file from the storage unit 41, and the main video file (for example, the 0th video file) designated by the
15 video description file is read in order from the storage unit 41 to the main video playback portion 42 and is displayed on the display 45. Further, the proxy video files 1 to n of the first to the nth video files described in the video description file are read in order from the storage unit
20 41 to the proxy video playback portions 71 to 7 n, and n pieces of the proxy videos are displayed on the display 45.

Next, by control from the command input portion 46, when a certain proxy video file (for example, the mth proxy video file) is designated from the controller 40, the
25 mth main video file is played back in the main video playback portion 42 and, at the same time, the information related to the 0th proxy video file is read into the video description

file processing portion 44, and the 0th proxy video file is read in order from the storage unit 41 to the mth proxy playback portion so that the playback of the mth proxy video can be switched to the playback of the 0th proxy video. In this way, the proxy video different from the main video being always played back can be play back, and video retrieval efficiency can be enhanced. A switching flowchart of the above described processing is shown in FIG.21B.

Next, a ninth embodiment of the present invention will be described with reference to FIG.22. This embodiment is characterized in that the main video, the scene image of the main video and one or a plurality of proxy videos are displayed.

In FIG.22, by control from the controller 40, the video description processing portion 44 reads in the designated video file from the storage unit 41. Next, the video description file processing portion 44 takes in order the main video file designated by the read video description file from the storage unit 41 and inputs it to the main video playback portion 42. The main video playback portion 42 reads the main video data and outputs a screen signal. The display 45 takes the screen output signal and the audio output signal from the main video playback portion 42 and performs the screen output and the audio output.

Further, the proxy video file designated by the video description file is taken in order from the storage unit 41 and is inputted to the proxy video playback portion 43.

The proxy video playback portion 43 reads in order the proxy video data and outputs the screen signal. The display 45 takes the screen output signal and the audio output signal from the proxy video playback portion and performs the screen output and the audio output.

Further, by control of the controller 40, a scene description file read-in portion 91 inputs the scene description file corresponding to the video file from the storage unit 41.

The current playback time obtained by the main video playback portion 42 is inputted to the scene description file read-in portion 91 and the time information sequence output portion 93. The scene description file read-in portion 91 takes the time information sequence data and the still image sequence output data from the storage unit 41 based on the inputted current playback time information, and inputs them to the time information sequence output portion 93 and the still image sequence output portion 94, and displays the time information sequence and the still image sequence on the display 45. As for the main video and the proxy video, the display method such as those of FIG.14A, FIG.14B can be used. As for the main video and the time information sequence and the still image information sequence, the display method such as those of FIG.3A, FIG.4A can be used.

The renewal of the display content is performed at the time information sequence output portion 93. The timing

of the renewal of the display content is the same as those described in FIGS. 3A, 3B and FIGS. 4A, 4B and FIG. 5, therefore, the description thereof will be omitted.

As for the time information sequence data to be inputted,
5 the time information sequence data positioned before and after the current playback time can be read from the time information sequence file stored in the storage unit 41. As for the still image sequence data, the still image sequence
10 corresponding to the read time information sequence data can be read from the still image file stored in the storage unit 41. As for the content of the time information sequence data, the description method as described in the first embodiment can be used. As for an example of the time
15 information, the video scene switching time of FIG. 6A and the key frame point time in the scene of FIG. 6B can be used.

Next, the ninth embodiment of the present invention will be described with reference to FIG. 23. This embodiment is such that the video file information designated by a command input portion 55 is inputted to a delivery controller
20 54 and, by control from the delivery controller 54, the video data designated by the command input portion 55 is taken in order from the storage unit 41 and is inputted to a main video transmitting portion 51a and/or a proxy video transmitting portion 51b. Similarly, by control from the
25 delivery controller 54, the scene description data related to the video designated by the command input portion 55 is taken in order from the storage unit 41 and is inputted to

a scene description data transmitting portion 52.

The main and/or proxy video data and the scene description data are read from the main video transmitting portion 51a, the proxy video transmitting portion 51b and
5 the scene description data transmitting portion 52, respectively at the designated data rate and are inputted to a network transmitting portion 53, and respective data are delivered to the network.

The main video transmitting rate can be decided by
10 calculating information quantity per unit time from the file size of the video file and the video playback time. As for the scene description data transmitting rate, it can be decided by calculating information quantity per unit time from the scene description file size and the video playback
15 time. As for other method, the transmitting rate can be decided by calculating information quantity per unit time from the time to be displayed finally in the scene description file and the scene description file size.

The command input portion 55 receives an input from
20 the terminal connected via a network 57 at a network receiving portion 56 and may use that information as a command input.

Next, an eleventh embodiment of the present invention will be described with reference to FIG. 24. This embodiment is such that, first, by control from the controller 40, the
25 video description file processing portion 44 reads in the designated video description file from the storage unit 41 of a server 50 via a network 58. Next, the video description

file processing portion 44 outputs the main video file and the proxy video file designated by the read video description file to a network transmitting portion 61 via the controller 40. The video file information designated by the command
5 input portion 46 of the client unit (terminal unit) 60 is inputted to the controller 40 and is outputted to the network transmitting portion 61.

The designated video file information is inputted to the network receiving portion 56 of the server 50 from the
10 network transmitting portion 61 via the network 58, and a command input processing is performed through the command input portion 55. By control from the delivery controller 54, designated main video and proxy video are taken in order from the storage unit 41 and are inputted to the main video
15 transmitting portion 51a and the proxy video transmitting portion 51b, respectively. Similarly, by control from the delivery controller 54, the scene description data related to the video designated by the command input portion 46 is taken in order from the storage unit 41 and is inputted to
20 the scene description data transmitting portion 52.

The main, proxy video data and the scene description data are read from the main video transmitting portion 51a, the proxy video transmitting portion 51b and the scene description data transmitting portion 52, respectively at
25 the designated data rate and are inputted to a network transmitting portion 53, and respective data are delivered to the network 58. The delivered video data, the proxy video

data and the scene description data are inputted to a network receiving portion 62 via the network 58 and are temporarily stored in a cache memory 63.

From the cache memory 63, the main video information,
5 the scene description information and the proxy video information are inputted to the main video playback portion 42, a scene description information read-in portion 91 and the proxy video playback portion 43, respectively. The action of the video description file processing portion 44
10 is the same as the action of FIG.22 and, therefore, the description thereof will be omitted.

The cache memory 63 reads in order the video information, the proxy video and the scene description information to be displayed next to the main video information, the proxy
15 video and the scene description information currently displayed on the display 45 from the server 50 via the network 58.

In general, when the scene description information file capacity is large, a large bandwidth is required each time
20 the scene description information is read. Therefore it takes a plenty of times until the next scene description information is read. In addition, there is a possibility of inhibiting the bandwidth to read the video data from the storage unit. However, when the cache memory 63 is used,
25 the scene description information can be continuously displayed on the display 45. Further, by continuously writing the scene description data into the cache memory

63, a data transmission bandwidth can be made constant and it is, therefore, possible to continuously play back the video without inhibiting a bandwidth necessary for reading the video from the delivery unit network-connected.

5 As described above, according to the above described sixth to eleventh embodiments, since a plurality of videos are constituted by the main video and the proxy video and these videos are allowed to be played back, a plurality of videos can be played back even in a limited transmission
10 bandwidth and decoding capacity.

Further, the video scene contained in the video can be read and retrieved so as to play it back.

Further, by displaying the description information in step with the playback of the video, the browsing and the
15 retrieval before and after the video being played back can be effectively performed.

Further, according to the present invention, regarding the video file inside the server network-connected, a plurality of video files can be played back without
20 increasing the processing load of the playback terminal or the video can be transmitted and read even in a limited network bandwidth.

Each of the first to eleventh embodiments is preferably realized by a personal computer, and the program of the
25 processing of each embodiment can be recorded and provided in a computer readable program recording medium. The recording medium includes not only a portable type recording

medium such as an optical disc, a floppy disc, a hard disc
and the like, but also a transmission medium temporarily
recording and holding data such as a network.

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